

1 CLAIMS

2 We claim:

- 3 1. A method for digitally processing transform data
4 representing a phenomenon, the method comprising:
5 performing an inverse transform of said transform data
6 to the real domain forming high-precision numbers;
7 and
8 manipulating said high-precision numbers to produce an
9 effect.
- 10 2. A method as recited in claim 1, further comprising
11 converting said high-precision numbers to integers and
12 clipping the integers to an allowed range forming
13 converted data.
- 14 3. A method as recited in claim 1, wherein the phenomenon is
15 an image.
- 16 4. A method as recited in claim 1, wherein said effect is
17 the chroma-key merging of two data sets.
- 18 5. A method as recited in claim 1, wherein said effect is
19 the color correction of image data.
- 20 6. A method as recited in claim 3, wherein said effect is a
21 90 degree rotation of the image.
- 22 7. A method as recited in claim 1, wherein said
23 high-precision numbers are floating point numbers.
- 24 8. A method as recited in claim 1, wherein said
25 high-precision numbers are fixed precision numbers
26 including a fractional part.

- 1 9. A method as recited in claim 1, wherein the step of
2 performing employs an inverse discrete cosine
3 transform.
- 4 10. A method as recited in claim 1, wherein the step of
5 performing employs an inverse discrete wavelet
6 transform.
- 7 11. A method as recited in claim 1, wherein the step of
8 performing employs an inverse discrete Fourier
9 transform.
- 10 12. A method for digitally processing transform data in the
11 real domain representing a phenomenon, the method
12 comprising:
13 performing an inverse transform of said transform data
14 to the real domain forming high-precision numbers;
15 and
16 performing a forward transform of said high-precision
17 numbers.
- 18 13. A method as recited in claim 12, wherein the inverse to
19 said forward transform is different from said inverse
20 transform.
- 21 14. A method as recited in claim 13, wherein said forward
22 transform is a forward discrete cosine transform and
23 said inverse transform is an inverse discrete wavelet
24 transform.
- 25 15. A method as recited in claim 1, further comprising
26 implementing an inverse quantization of transform-coded
27 data forming the transform data.

- 1 16. A method as recited in claim 15, further comprising
2 converting said high-precision numbers to integers and
3 clipping the integers to an allowed range forming
4 converted data.
- 5 17. A method as recited in claim 15, further comprising
6 entropy decoding coded data to form the transform-coded
7 data
- 8 18. A method as recited in claim 17, wherein said coded data
9 are coded image data.
- 10 19. A method as recited in claim 17, wherein said coded data
11 are coded video data.
- 12 20. A method as recited in claim 18, wherein said coded
13 image data are in a JPEG still image international
14 standard format.
- 15 21. A method as recited in claim 19, wherein said coded
16 video data are in a MPEG motion video international
17 standard format.
- 18 22. A method as recited in claim 15, wherein the step of
19 performing employs an inverse discrete cosine
20 transform.
- 21 23. A method as recited in claim 15, wherein the step of
22 performing employs an inverse discrete wavelet
23 transform.
- 24 24. A method as recited in claim 15, wherein the step of
25 performing employs an inverse discrete Fourier
26 transform.

- 1 25. A method as recited in claim 15, wherein said
2 high-precision numbers are fixed precision numbers that
3 include a fractional part.
- 4 26. A method as recited in claim 12, further comprising
5 manipulating said high-precision numbers to produce an
6 effect.
- 7 27. A method for digitally processing transform-coded data
8 representing a phenomenon, the method comprising:
9 performing an inverse quantization of the
10 transform-coded data forming transform data;
11 performing an inverse transform of said transform data
12 to the real domain forming high-precision numbers;
13 performing a forward transform of said high-precision
14 numbers forming forward transformed data; and
15 performing a quantization of said forward transformed
16 data forming quantized data.
- 17 28. A method as recited in claim 27, further comprising:
18 entropy decoding coded data forming transform-coded
19 data employing entropy decode; and
20 entropy encoding the quantized data employing entropy
21 encode forming encoded data.
- 22 29. A method as recited in claim 27, further comprising
23 manipulating said high-precision numbers to produce an
24 effect.
- 25 30. A method as recited in claim 27, further comprising
26 converting said high-precision numbers to integers and
27 clipping to an allowed range forming converted data.

- 1 31. A method as recited in claim 29, further comprising
2 alternating manipulating steps with the steps of
3 performing a forward transform, performing a
4 quantization, entropy encoding, entropy decoding,
5 performing an inverse quantization, and performing an
6 inverse transform a desired number of times.
- 7 32. A method as recited in claim 31, wherein said coded data
8 are compressed data, and each step of alternating
9 implements a compression/decompression cycle.
- 10 33. A system employing the method recited in claim 31,
11 wherein each step of alternating recompresses and
12 decompresses coded data to enable an editing operation.
- 13 34. A method as recited in claim 28, wherein said coded data
14 are coded audio data.
- 15 35. A method as recited in claim 28, wherein said coded data
16 are coded electromagnetic environment data.
- 17 36. A method as recited in claim 28, wherein said coded data
18 are coded video data.
- 19 37. A method as recited in claim 28, wherein said coded data
20 is encoded in the JPEG standard format.
- 21 38. A system for digitally processing first level
22 transform-coded data in the real domain representing a
23 phenomenon, the system comprising:
24 a first inverse quantizer to generate transform data
25 from said transform-coded data;
26 a first inverse transformer to produce an inverse
27 transform of said transform data to the real
28 domain forming high-precision numbers;

- 1 a first forward transformer for forward transforming
2 said high-precision numbers forming forward
3 transformed data; and
4 a first quantizer for quantizing said forward
5 transformed data to form quantized data.
- 6 39. A system as recited in claim 38, wherein the forward
7 transformer employs a different transform type than a
8 first transform type employed by the inverse
9 transformer.
- 10 40. A system as recited in claim 38, wherein said forward
11 transformer produces a forward discrete cosine
12 transform and said inverse transformer produces an
13 inverse discrete wavelet transform.
- 14 41. A system as recited in claim 38, further comprising:
15 a manipulator for manipulating the high-precision
16 numbers to produce an effect.
- 17 42. A system as recited in claim 38, wherein said inverse
18 quantizer and said quantizer use identical quantization
19 values.
- 20 43. A system as recited in claim 41, wherein only a subset
21 of the quantized transform data produced different
22 transform-coded data.
- 23 44. A system as recited in claim 38, wherein said inverse
24 quantizer and said quantizer use at least one different
25 quantization value.
- 26 45. A system as recited in claim 38, further comprising:

- 1 an entropy decoder to form the transform-coded data
2 from coded data; and
3 an entropy encoder to encode the quantized data.
- 4 46. A system for digitally processing transform data
5 representing a phenomenon, the system comprising:
6 an inverse transformer to perform an inverse transform
7 of the transform data to the real domain using
8 high-precision numbers; and
9 a manipulator to manipulate the high-precision numbers
10 to produce an effect.
- 11 47. A system as recited in claim 46, further comprising a
12 converter to convert said high-precision numbers to
13 integers, and a clipper to clip the integers to an
14 allowed range.
- 15 48. A system for digitally processing transform-coded data
16 representing a phenomenon, the system comprising:
17 an inverse quantizer to perform an inverse quantization
18 of said transform-coded data to form transform
19 data;
20 an inverse transformer to perform an inverse transform
21 of said transform data to the real domain forming
22 high-precision numbers; and
23 a manipulator for manipulating the high-precision
24 numbers to produce an effect.
- 25 49. A system as recited in claim 48, further comprising a
26 converter to convert said high-precision numbers to

1 integers, and a clipper to clip the integers to an
2 allowed range.

3 50. A system for digitally processing transform data in the
4 real domain representing a phenomenon, the system
5 comprising:

6 an inverse transformer to produce an inverse transform
7 of the transform data to the real domain to form
8 high-precision numbers; and
9 a forward transformer to forward transform the
10 high-precision numbers.

11 51. A system as recited in claim 50, further comprising:

12 a manipulator to manipulate the high-precision numbers
13 to produce an effect.

14 52. A system as recited in claim 41, wherein the quantized
15 data forms an other level of transform-coded data and
16 further comprising:

17 another inverse quantizer, another inverse transformer,
18 another manipulator, another forward transformer,
19 and another quantizer to perform together a
20 similar function on the other level of
21 transform-coded data as performed on the first
22 level transform-coded data.

23 53. A system as recited in claim 52, wherein the effect
24 produced by the first manipulator is a different type
25 of effect from that produced by the other manipulator.

26 54. A system as recited in claim 52, wherein the functions
27 of the first inverse quantizer, first inverse
28 transformer, first forward transformer, and first

1 quantizer, and the respective functions of said another
2 inverse quantizer, another inverse transformer, another
3 forward transformer, and another quantizer are each
4 performed by a same module.

5 55. A method as recited in claim 2, further comprising
6 providing said converted data for use by an output
7 device.

8 56. A method as recited in claim 55, wherein the output
9 device is a display monitor.

10 57. A method as recited in claim 55, wherein the output
11 device is a raster display monitor.

12 58. A method as recited in claim 1, wherein the transform
13 data includes information of a spectral analysis.

14 59. An article of manufacture comprising a computer usable
15 medium having computer readable program code means
16 embodied therein for digitally processing transform
17 data representing a phenomenon, the computer readable
18 program code means in said article of manufacture
19 comprising computer readable program code means for
20 causing a computer to effect:

21 performing an inverse transform of said transform data
22 to the real domain forming high-precision numbers;
23 and

24 manipulating said high-precision numbers to produce an
25 effect.

26 60. An article of manufacture as recited in claim 59, the
27 computer readable program code means in said article of
28 manufacture further comprising computer readable

1 program code means for causing a computer to effect
2 converting said high-precision numbers to integers and
3 clipping the integers to an allowed range forming
4 converted data.

5 61. An article of manufacture as recited in claim 59,
6 wherein the phenomenon is an image.

7 62. A computer program product comprising a computer usable
8 medium having computer readable program code means
9 embodied therein for digitally processing transform
10 data in the real domain representing a phenomenon, the
11 computer readable program code means in said computer
12 program product comprising computer readable program
13 code means for causing a computer to effect:
14 performing an inverse transform of said transform data
15 to the real domain forming high-precision numbers;
16 and
17 performing a forward transform of said high-precision
18 numbers.

19 63. A computer program product as recited in claim 62,
20 wherein the inverse to said forward transform is
21 different from said inverse transform.

22 64. A computer program product as recited in claim 62,
23 wherein said forward transform is a forward discrete
24 cosine transform and said inverse transform is an
25 inverse discrete wavelet transform.

26 65. A program storage device readable by machine, tangibly
27 embodying a program of instructions executable by the
28 machine to perform method steps for digitally

1 processing transform-coded data representing a
2 phenomenon, said method steps comprising:
3 performing an inverse quantization of said
4 transform-coded data forming transform data;
5 performing an inverse transform of said transform data
6 to the real domain forming high-precision numbers;
7 and
8 manipulating said high-precision numbers to produce an
9 effect.

10 66. A computer program product as recited in claim 65, the
11 computer readable program code means in said computer
12 program product further comprising converting said
13 high-precision numbers to integers and clipping the
14 integers to an allowed range forming converted data.

15 67. A program storage device readable by machine, tangibly
16 embodying a program of instructions executable by the
17 machine to perform method steps for digitally
18 processing transform-coded data representing a
19 phenomenon, said method steps comprising:
20 performing an inverse quantization of the
21 transform-coded data forming transform data;
22 performing an inverse transform of said transform data
23 to the real domain forming high-precision numbers;
24 performing a forward transform of said high-precision
25 numbers forming forward transform data; and
26 performing a quantization of said forward transformed
27 data forming quantized data.

- 1 68. A program storage device readable by machine as recited
2 in claim 67, said method steps further comprising
3 manipulating said high-precision numbers to produce an
4 effect.
- 5 69. A program storage device readable by machine as recited
6 in claim 67, said method steps further comprising
7 converting said high-precision numbers to integers and
8 clipping to an allowed range forming converted data.
- 9 70. A program storage device readable by machine as recited
10 in claim 67, said method steps further comprising:
11 entropy decoding coded data forming transform-coded
12 data employing entropy decode; and
13 entropy encoding the quantized data employing lossless
14 entropy encode forming encoded data.
- 15 71. A program storage device readable by machine as recited
16 in claim 70, said method steps further comprising
17 alternating said manipulating steps with said steps of
18 performing a forward transform, performing a
19 quantization, entropy encoding, entropy decoding,
20 performing an inverse quantization, and performing an
21 inverse transform a desired number of times.
- 22 72. A program storage device readable by machine as recited
23 in claim 71, wherein said coded data are compressed
24 data, and each step of alternating implements a
25 compression/decompression cycle.
- 26 73. A program storage device readable by machine as recited
27 in claim 70, wherein the phenomenon is image data
28 encoded in the JPEG standard format.

- 1 74. A method for digitally processing transform data in the
2 real domain representing a phenomenon, the method
3 comprising:
4 performing an inverse transform of said transform data
5 to the real domain forming high-precision numbers;
6 converting the high-precision numbers to integers which
7 include out of range data; and
8 performing a forward transform of the integers forming
9 forward transformed data.
- 10 75. A method as recited in claim 74, further comprising
11 manipulating the integers to produce an effect.
- 12 76. A method as recited in claim 74, further comprising:
13 performing an inverse quantization of transform-coded
14 data to form the transform data; and
15 performing a quantization of said forward transformed
16 data forming quantized data.
- 17 77. A method as recited in claim 74, further comprising
18 clipping the integers to an allowed range forming
19 converted data.
- 20 78. A method as recited in claim 76, further comprising
21 alternating manipulating steps with the steps of
22 performing a forward transform, performing a
23 quantization, performing an inverse quantization, and
24 performing an inverse transform a desired number of
25 times.
- 26 79. A program storage device readable by machine, tangibly
27 embodying a program of instructions executable by the

- 1 machine to perform method steps for digitally
2 processing transform data in the real domain
3 representing a phenomenon, said method steps
4 comprising:
5 performing an inverse transform of said transform data
6 to the real domain forming high-precision numbers;
7 converting the high-precision numbers to integers which
8 include out of range data; and
9 performing a forward transform of the integers forming
10 forward transformed data.
- 11 80. A program storage device readable by machine, as recited
12 in claim 79, further comprising manipulating the
13 integers to produce an effect.
- 14 81. A program storage device readable by machine, as recited
15 in claim 79, further comprising performing an inverse
16 quantization of transform-coded data to form the
17 transform data.
- 18 82. A program storage device readable by machine, as recited
19 in claim 79, further comprising performing a
20 quantization of said forward transformed data forming
21 quantized data.
- 22 83. A program storage device readable by machine, as recited
23 in claim 79, further comprising clipping the integers
24 to an allowed range forming converted data.
- 25 84. A method as recited in claim 17, wherein said coded data
26 are coded audio data.
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